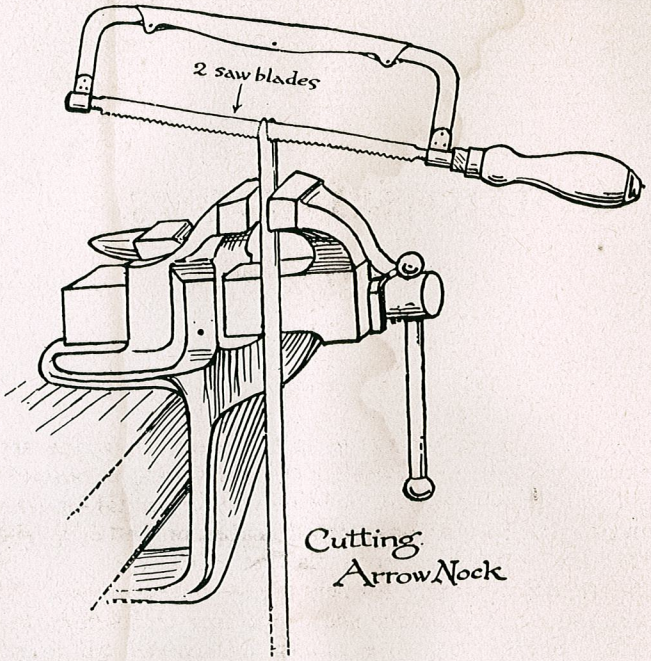



easiest way to cut this nock is to saw it with three hack-saw blades tied together in a hack-saw frame so that they won't spread apart. Or it can be done with two cuts of a hack-saw or another fine saw, afterwards removing the wood between the cuts with a knife or using the side of the teeth of the saw. The edge and bottom of the nock must be smoothed up with a file having a round edge, or with sandpaper around a narrow strip of wood. The nock should then be rounded off on the outside.



# 8. FLETCHING ARROWS

By Henry Cheatham

FLETCHING is the name given the act of putting feathers on arrows. Perfect fletching is beyond the skill of the beginner, but, by being careful and taking enough time at first, one can produce a passable, or, better, a "shootable" job of fletching upon his first attempt.

First remember that feathers are needed on arrows. They catch the air, holding the shaft head first on its flight to the mark. Feathers put on in almost any manner will keep the shaft traveling head first, but unless the fletching is well done, the arrow will wabble or "wag." In some cases, the arrow will spin too fast, which will slow down its flight. A well-fletched shaft should travel in a steady flight without wabbling, and with a very slight spin caused by the natural pitch of the feathers. The spin adds to the steadiness of the arrow during flight.

The next consideration is material. Turkey wing feathers are the best for the beginner, mainly because they are plentiful and inexpensive. Many archers prefer their feathers dyed with bright colors, while others prefer the plain gray-wing pointers with distinct markings. Whether the dye detracts from the quality of the feather or not is questionable, but surely the natural feather can not be questioned as to quality.

Preparing feathers is a most important task, and has much to do with the way the finished article will look.

Since each arrow has three pieces of feather on it, and

each turkey feather will yield three sections of feather, the usual way is to fletch arrows in sets of three, making it possible to get all three feathers on the arrow from the same part of the turkey feather. Remember that there are three tips, three middles, and three lower ends, so one arrow will be feathered with all tips, the next with middles and the third with lower end pieces.

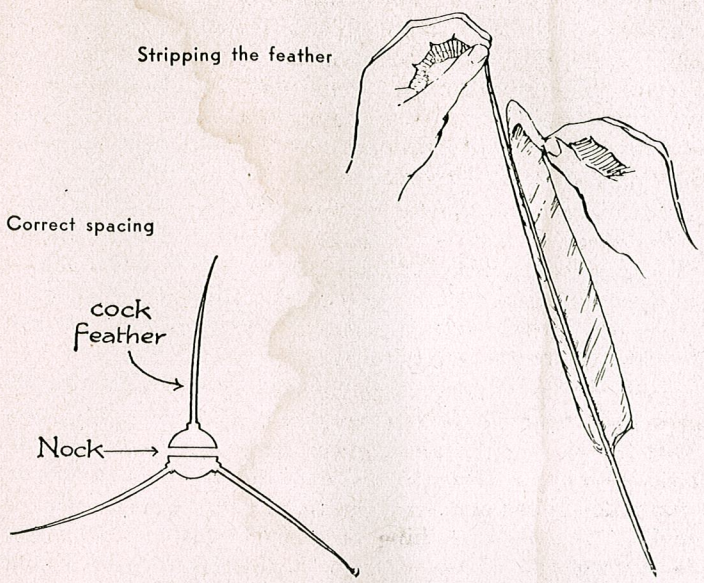
Select three wing feathers all of about the same size and stiffness of vein from the same side of the bird for stripping. Stripping the feather from the quill is very easy after one acquires the knack of starting the strips without having some of the pith from the quill left on. Practice on a few bad feathers before using good ones.

Take the tip of the quill at the small end between the fingers and thumb of the left hand and, with the right, using only the tips of the fingers, grasp the vein of feather just a little below the left thumb, as near the quill as possible. Then, with a downward pull, strip the vein of the feather from the quill. The important thing to remember is to strip *down* the feather and not away from the feather. There should be no pith on the feather when it is stripped.

When the feather is stripped, take the piece to be used and, with sharp scissors, trim all the surplus quill from the back of the feather. When all three feathers have been trimmed, place them together with all quill edges even, and with tips togther. With a pair of scissors, snip off about an inch of the tips, thus leaving a firm, even end from which to measure. Keep the feathers together and cut them up into three sets, making them a little longer than the feather pattern. Now, there are three tips for one arrow, three middles for another, and three butts for a third. The feathers are now ready for use, and the shafts must be prepared.

To begin putting the shafts in readiness, make a mark on the nock end 1 inch from the bottom of the nock. This is to be the back end of the feathers, which are as near the end of the shaft as possible without bothering the fingers while shooting. Three feathers are spaced at even distances apart on the shaft, and the first, or "cockfeather," is placed perpendicular to the nock. In order to get the base of the






feather straight, put a pencil line where the feather is to go. If you have trouble in spacing your line by eye, a pair of small dividers is a big help.

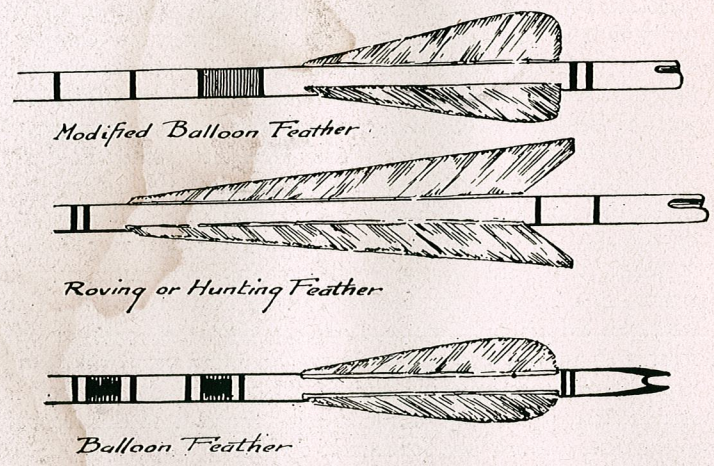
There are several kinds of glue that do very nicely, but probably the best is household cement. Put a few drops of cement on the shaft where the feathers are to be applied. Smooth out thinly with the finger, and let it dry. Using the tube of cement as the applicator, spread a small amount of glue on the quill edge of the "cock feather." Then hold the shaft in the left hand, with the back end of the feather between the thumb and forefinger firmly and press the feather on the shaft on the line drawn for the "cock feather." Remember, the veins of the feather always slant toward the rear. The base of the feather can be adjusted to the line with the thumb nail before the cement has set. When this feather is in place, put the cement on the next feather and press it on, remembering that if the rear of the feather is struck first, it is much easier to stick the rest of the feather to the line. Work one feather at a time.

When the three feathers have been put on and adjusted stick the arrow in a rack, or in anything that will hold it in an upright position, to dry, as laying it down, might cause a feather to fall over.

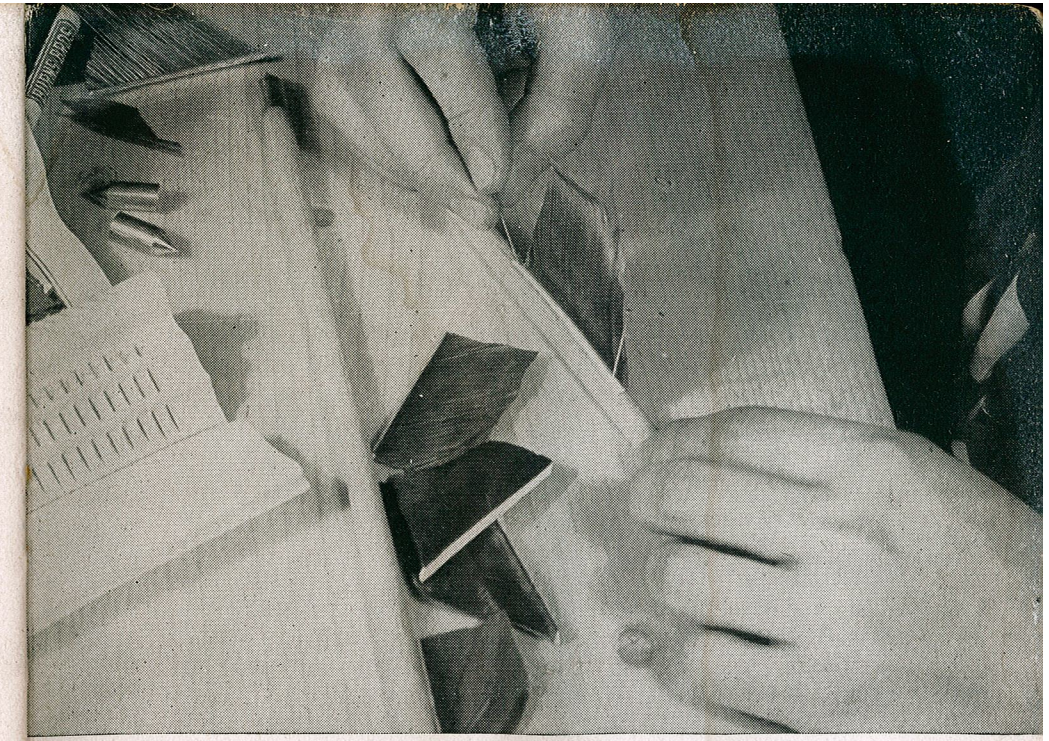
When all three arrows are feathered, the next operation is to trim the feathers to the desired shape and size. The shape of a feather has always been the point of much argument, but I am telling you something that will work. The feathers on target arrows are usually made from 2 to 3 inches long, and from ⅜ to ⅝ inch high. Their shape is usually a smooth curve with its sharpest point near the rear of the feather.

The feathers of heavy hunting arrows are, necessarily, much larger because of the weight of the shaft and head. They range from 4 to 6 inches long, and from ½ to 1 inch high, and, although I prefer them the same shape as those of my target arrows, there are many who use a straight-cut beginning close to the shaft in front and widening to nearly an inch at the rear. I believe the curved feather makes a more quiet arrow.

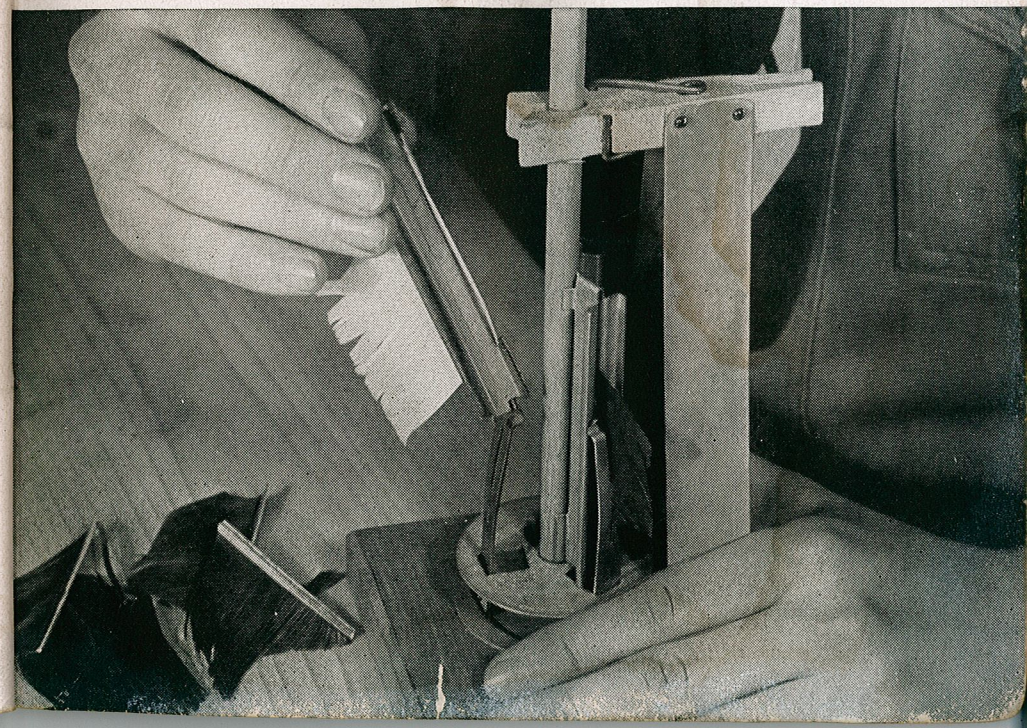
When you decide on the pattern of your feathers, there are several methods of trimming them. Probably the simplest

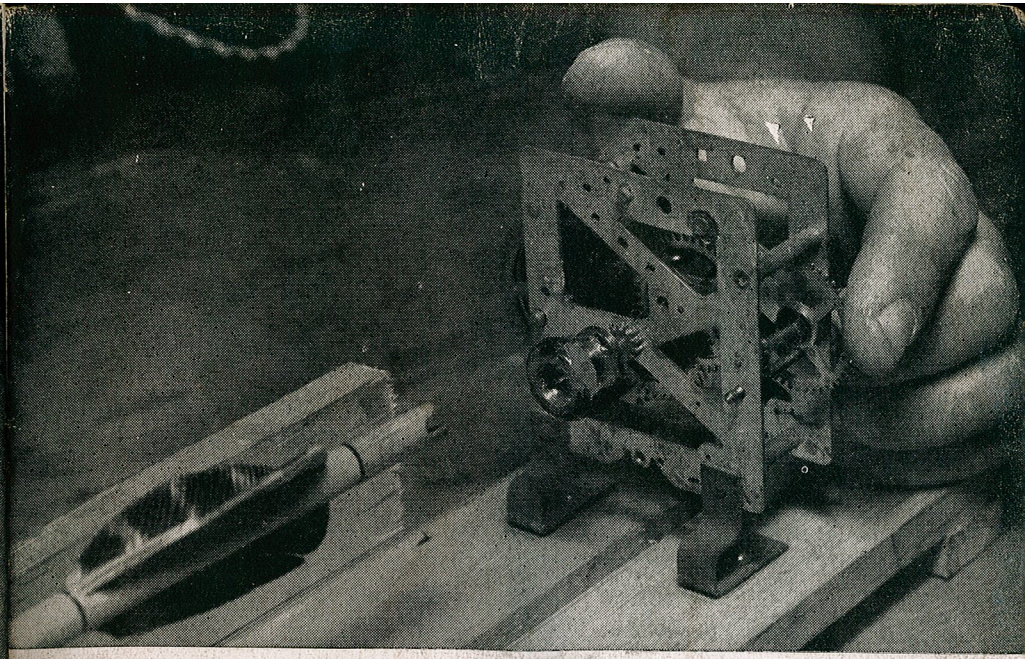




GLUING FEATHERS BY PIN OR MACHINE METHODS



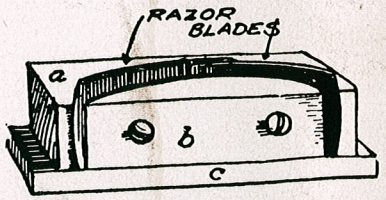


ABOVE—Arrow Lathe: The arrow is having the owner's stripes painted on it. The inside works of the clock at right turn it as desired. The arrowhead spins in the hollow end of the wing screw at left. Complete instructions and plans by H. Richard Price were published in SCOUTING, January, 1937.

UPPER RIGHT—Here is the clock work motor. The brass centering head which is turned by the clock work has a wire set across it to grip the arrow nock and turn the arrow.

LOWER RIGHT—These are the parts of the adjustable end block, in which the arrowhead turns.

is that of using a templet of celluloid or cardboard the shape of the feather. Using this as a pattern, trim the feather with sharp scissors. First trim the rear ends, being careful to get them all even. Then place the pattern on the other side and trim the fronts. This will take practice, and I advise you to try a few times on some cast-off feathers. It may save you a lot of work.



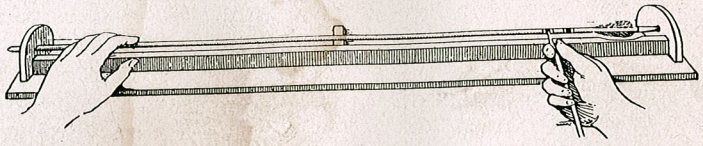

**FEATHER CUTTER**

**a, b, and c block fastened together with screws.**

*Devised by E. D. McLean, Orlando, Fla. K. T. Duryea of Seattle uses broken phonograph springs successfully.*

Another method* is to make a die, using razor blades set in a hardwood block. Once the die is made, it is possible to trim the arrows more quickly. In making a great number of arrows, it pays to make a die.

After trimming, whether with scissors or die, the surplus ends of the feather must be cut off with a knife. When this has been done, put a small drop of cement on the front tip of the feather to make sure that it does not pull off the shaft. The arrow is now fletched, except for painting.



Painted stripes add greatly to the beauty of the arrow. Use your school or class colors, or work out a distinctive color pattern so that you will always recognize your own arrows.

When you have turned out a number of good arrows, you will want to try your hand at making footed matched arrows with cut feathers on them. But at the start, the simpler method described is considered best.

* The one illustrated devised by Mr. E. D. McLean, of Orlando, Fla. Scoutmaster Kore T. Duryee of Seattle, uses broken phonograph springs successfully.



# 9. MAKING THE BOWSTRING

## By Fred C. Mills

TO MAKE A BOWSTRING, you'll want to use either Irish linen thread or one of the synthetics—dacron or fortisan. The bowstring is made the same with all three materials, although synthetics do not require as many strands as linen for bows of equal weight.

Take a 2-ounce ball of thread, get a small box into which the ball will fit well and cut a small hole through the cover. Take the end of the thread from the inside of the ball, and run it through the hole in the cover. If you haven't a small box, take a small heavy manila envelope and run the end of the string through a hole in the top flap. In this way you can use every inch of the thread; otherwise you will probably lose 20 or 30 yards at the end because of snarling.

There are several ways of making bowstrings. The one which is described below is simple. With a little practice, the string can be made, wound, and stretched on the bow in half an hour.

First, get out the three main strands. For bows up to 50 pounds weight, a 36 thread string is heavy enough. This is made up of 3 strands with 12 threads in each strand.

On the front of your bench or on one side of a wooden wall about waist high, place 2 nails 16 inches farther apart than the length of your bow. Take the end of the thread and tie around one nail. Now carry the thread around the other nail and back. Continue this until you have 12 threads, 6 running each way. Make the thread fast at the end of the twelfth turn and break off the thread.

Tapering string ends

Now take a small piece of beeswax* and rub this strand well with the wax until all the threads hang together. With a knife cut the ends loose from the nails. Place one end at a time on the flat surface of the bench or board, and with the edge of a dull knife scrape the ends out until they form a natural taper. Now wax these ends again thoroughly and hang up this first strand. Prepare the second and third strands in the same manner.

The great strain on a bowstring comes where the string engages the bow at the nocks. It is therefore important to reenforce these points so as to give them added strength. This is done by making one full-length strand, using only 6 threads instead of 12. Then after thoroughly waxing this strand, cut it into 6 equal parts. Scrape each end of these short pieces until they are tapered. Place 3 of them aside for the lower end of the string. Take the other 3 for the upper end.

Now take your long strands one at a time, and on the upper end add the short reenforcing strand. Let the short reenforcing strand extend about an inch out beyond the end of the long strand. Now take your wax and rub these two strands together until they thoroughly adhere to each other. Repeat this with the second and third strand.

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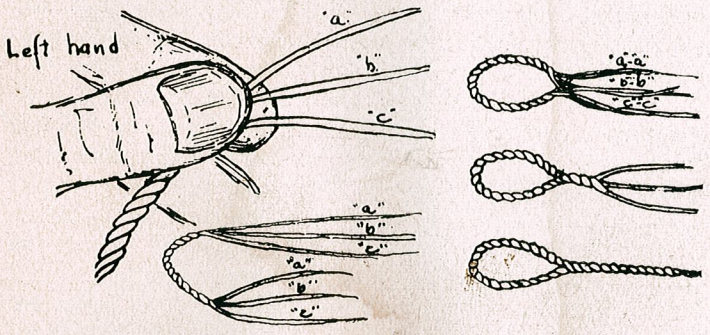
* Secure pure beeswax, melt it in a can, being careful that the flame is not high enough to burn wax. In another can melt a little resin—about three parts wax to one of resin. When both are melted mix them together and pour into a wax cup or into a cup lined with wax paper, to harden. The resin improves the sticking qualities of the beeswax.



Now lay the three strands together. With the thumb and first finger of the left hand, grasp the three strands at a point about 9 inches from the ends, the ends being extended toward your right hand. Grasp the strand farthest from you with the thumb and first finger of the right hand. Now roll it away from you in order to make it twist (don't twist hard), and then pull it toward you over the other two strands, then place the thumb of the left hand on top of it. Now again pick up the strand farthest away from you, twist it as you did the first one, bring it toward you again, locking it down with the thumb. Repeat this with the third strand.




Making the loop

When this is done, begin all over again, and continue twisting the farthest strand away from you, bringing it over the other two and toward you, until you have made rope for about 2½ inches.

Now then, turn back the ends on the body of the string so that the loop is formed by the rope that you have made. If the short ends have become twisted, untwist them until every thread lies flat.

Take the short end that is farthest away from you, remove any twist, and lay it down on the main strand that is farthest away from you. Wax them together. As you wax, give the strands a slight twist with the thumb and first finger away from you.

Now take the middle short end and lay it down on the middle main strand, and wax and twist it away from you. Then take the short end closest to you, lay it down on the main strand close to you, and wax and twist these together.

Now, with the thumb and first finger of the left hand, you will hold the loop in its crotch. Take the strand farthest from you, twist it away from you, and then bring it toward you. Repeat this with each strand as you did when making rope in the first operation.

Continue this down for about 1 inch beyond the point where the short ends are waxed on to the long main strands. This will give a taper to the end of the bowstrings. You will find that in twisting in this end, the main strands will get tangled up, so you must frequently comb them out with your fingers.

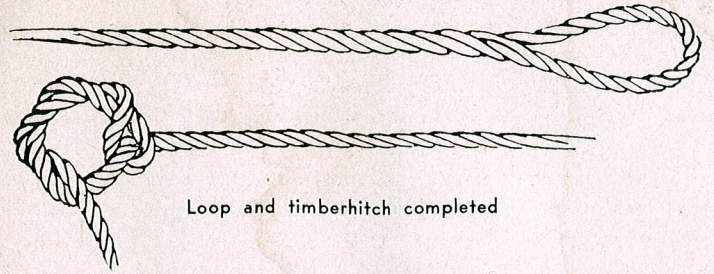
When the loop is finished, place it on a hook or nail on the wall. With a short piece of string, tie a bow knot at the end of the twist, in order to keep it from untwisting while you are working on the lower end, and draw each of the main strands out evenly (see that they are not twisted).

Now wax reenforced strands on the other end. When you have all these waxed on, take the three strands, about 3 inches above the point where the reenforcements begin, see that they are all lying flat and untwisted, and hold them between the thumb and first finger of the left hand, pulling them tight, so that each main strand will be exactly the same length.

Now, with the thumb and first finger of the right hand start making rope again, as you did on the other end, and continue this out to the ends of the string. This will give a loop in the upper end for the notch of the bow, and a tapered rope at the other end.

Note that the middle of the string has not as yet been twisted. Now, still leaving the loop over the hook on the wall, wax thoroughly, and start to twist the string, with the thumb and first finger of the left hand away from you as you wax the string with the right hand. This will mean that you are twisting this string counter-clockwise, that is, from the left toward the right. This is in accordance with





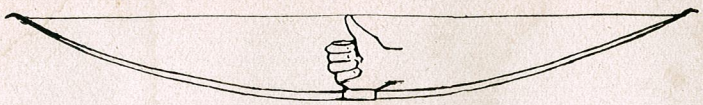
Loop and timberhitch completed

the way you have been twisting your string since you started making it. When the string is well twisted together, rub with a piece of cloth, leather, or paper, to make it round. Don't twist it too tightly. If you do, it will cut.

The rule I follow is to twist the strands up rather tight, and then release them. They will then untwist themselves until the string is twisted just enough.

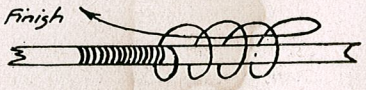
Some archers prefer loops on each end of the string. This makes a very neat job, but will not prove nearly so satisfactory in the end as the use of timber hitch at the lower end of the bow. When a double loop string stretches, it can only be shortened up by twisting. If it is twisted to any considerable extent, it will kink and cut itself, whereas if a timber hitch is used, it is only necessary to take the timber hitch out and shorten up the string. At a recent National Archery Tournament, I took pains to look over the strings of each man, in order to find out whether the double loop or the single loop with timber hitch was most preferred by these experts. In the entire men's section, I found only two archers, both of them novices at this shoot, who were using the double loop.

It is general practice to wind the center of the bowstring at the point where the fingers and arrow come in contact with it, in order to insure the string against being worn out by contact. Any good tough thread may be used, such as carpet thread, mercerized silk or silk twist. The easiest way to do this I believe, is to put a new string on the bow, putting in the timber hitch at the lower end so that the upper loop will be about 6 inches below the upper nock, bracing the



The fistmele

bow. You will probably find that the bow is strung more than the usual fistmele. This, however, will cause the string to stretch. Now place the cloth or paper around the handle of the bow to protect it, and place it in your bench vise with the string turned up toward you. Start winding as shown in illustration, about 2 inches above the shooting point and wind down toward the lower end for 5 inches. Make fast the end as shown in illustration. Now take a little shellac on a cloth and rub over this serving. When this is dry, put on a second coat with a drop of oil and rub it rapidly back and forth for a few seconds until dry. Now take a piece of candle wax and rub the serving thoroughly. This waxing takes up the weight on the string and also permits the arrow and fingers to slip away easily. Then, with a piece of soft leather or a cloth, rub the bowstring smartly over its whole length, in order to make it smooth and round. Follow this up with beeswax. You will probably find that your bowstring has stretched until it is no more than 7 inches from the handle of your bow, which is usually considered about the right distance for target bows.




Serving the center of the bowstring



# 10. ARCHERY ACCESSORIES

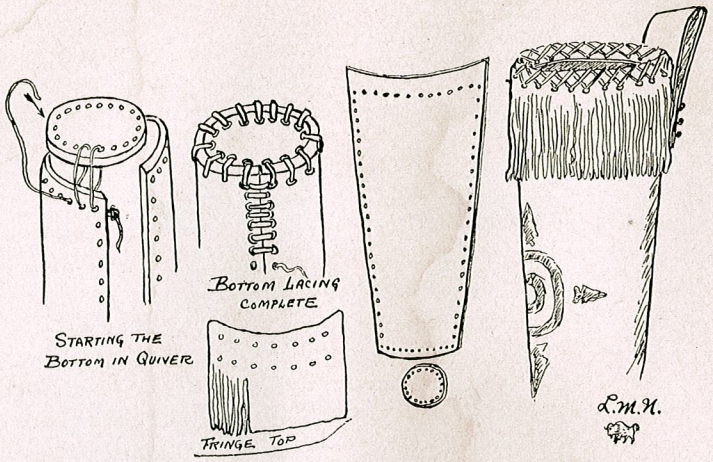
## By Leigh M. Nisbet

GOOD ARCHERY EQUIPMENT is appreciated far more if the archer himself makes it and he will find the Merit Badge pamphlets on Archery and Leatherwork a fine help. For a man to journey afield with a good longbow and shafts of his own manufacture, a sturdy quiver of his own design at his belt or shoulder, and a belt pouch containing bracer, tips, and a small repair kit of his own make is enough to give him the thrill of his life.

### The Quiver

Perhaps the most durable material for quivers is rawhide. It has the added advantage of being unusually light in weight, and it lends itself to brilliant color decoration. Rawhide may be secured from leather dealers in towns and cities. It looks like the parchment used for lampshades except that it is heavier.

Unless the quiver is designed for heavy broadheads, it should be cut to make a quadrilateral, 18 inches on two sides, 10½ inches at the larger end (top) and 8¾" at the smaller end. A circular piece of rawhide 2¾ inches in diameter is cut for the bottom. When assembled this gives a quiver 18 inches in height with a circular bottom of 2¾, and an open




Clarified Rawhide Quiver

top approximately 3 inches in breadth, and should conveniently hold a dozen target arrows or light hunting broadheads.

Rawhide may be punched with the ordinary leather punch, but will likely cause some stiff muscles unless moistened first. The quiver may be assembled either dry or wet whichever you prefer. As the steps in assembling are practically the same, the dry method will be described first.

A series of holes should be spaced with a divider or rule about ¼ inch from the edge on both of the long sides, also a row across the top about ½ inch apart and the same distance from the upper edge, and a series of holes across the bottom about ¼ inch from the lower edge.

The holes at the bottom should conform to the holes in the circular bottom piece in number. It is best to make the holes in the bottom piece first, as this is the most difficult job. For a good close-lacing job there should be in the neighborhood of thirty-two holes in the bottom piece and a corresponding number across the lower edge of the quiver body. For piercing the rawhide, use an old knitting needle broken in two and the pieces inserted in short ends of arrow dowels.



This gives two burning tools, one to heat while the other is being used. With these tools heated red hot over a gas flame, the rawhide may be pierced with no effort at all, but with considerable smell for a few minutes. Great care should be taken to see that the holes along the two sides are evenly spaced or the finished quiver will not lace neatly or hang properly.

Before commencing to lace the quiver together, a piece of heavy felt should be glued to the inside of the circular bottom to protect the arrows in the quiver.

When all holes are punched or burned you are ready to begin the assembly. If rawhide thong is to be used for lacing it must be well moistened before use and moistened frequently throughout the process, as it dries rapidly from the heat of the hand and the friction. The long lacing thong should have a knot in one end with a few inches of thong left over. Working from what will be the inside of the quiver when completed, pull this thong through the hole nearest the bottom on one of the sides and over the edge of the bottom piece coming up through one of the holes in this circular disc. Insert the thong in the next hole on the bottom edge of the quiver from the inside, pull through over the edge of the bottom disc and up through, and to the next bottom hole in the quiver from the inside. Continue this process until the bottom piece is entirely laced to the quiver body.

With a marline spike and the thumb, begin at the first hole and tighten each stitch until body and bottom are laced tightly together. The original anchor knot may now be untied and the two ends united in a firm knot. Then continue the lacing by joining the two sides if enough thong remain for the purpose. If not, another thong may be spliced in. Any stitch may be used for the sides, a simple over-cast, or a cross-stitch of some kind. At the top it is best to return the stitches through a few holes as this method of fastening will avoid the use of a knot where the belt loop must be later attached.

For the top fringe take a piece of split cowhide, chamois, or some soft leather and cut to size 10½ by 4 to 5 inches.

Two rows of holes should be punched to conform in number with the row of holes in the top edge of the quiver and should be an inch apart, so that when the piece is folded down over the top rim of the quiver the lacing may fit through the three thicknesses (that is, the fringe piece folded over the rawhide of the quiver). Any piece of bright-colored thong leather may be used and the lacing may be crossed back and forth in varied pattern as long as the leather lasts. This will give a very stiff rim to the quiver properly set off by the fringing which may be cut almost up to the lacing holes.

A belt loop, 2½ inches by 10, may be doubled to make a loop ample for the broadest archer's belt and still leave enough space for lacing to the quiver. Holes in the rawhide for the belt strap may be burned and punched in the loop itself, and heavy lacing should be used, since the strain is greater on this loop than on other parts of the quiver. Good designs for quiver decoration are hunting horns, bows and arrows, Patrol emblems, camp honor insignia, and archery targets in miniature. The ordinary commercial brushing lacquer gives brilliant color and is recommended for decorating. When the lacquer is dry all rawhide parts of the quiver should be varnished or shellacked. A high and almost transparent finish will be the result.

The rawhide quiver may be worked up when wet, or when still green, by employing practically the same methods, except that it must be dried over a wooden form when completed in order to give the quiver the proper shape. Dry rawhide will frequently cut the fingers as its edges are very sharp, but this disagreeable feature is absent when working the hide wet. Wet hide will also punch much more easily. The disadvantages are that the work must be hurried as the hide dries very rapidly. It is sometimes impossible to complete the assembly job in one work period, and if the quiver is laid aside until another opportunity for work it will be found to have dried and shrunk. It is rather a difficult matter to get it soft again without damaging the work already done on it.

Quivers may be of soft leather such as split cowhide,



calf, or sheep hides. Black pebble grain oil cloth also makes an excellent and inexpensive quiver. To make a round quiver the directions for the rawhide article will apply, except that the top is folded down to make the fringe while the quiver should be cut approximately 24 inches in length to cover this additional need. Two rows of holes should be punched at the top as was done on the fringe piece for the rawhide job, but in this case a cord of about ¼ inch in diameter should be placed beneath the fold and lashed in place with bright-colored thong leather. This will make the mouth of the quiver bell out and will hold it open. Decoration for quivers of soft leather or oil cloth can be made by brushing lacquer on, which takes well on both of these materials.

Soft leather and oil cloth may also be used for the flat quiver of the American Indian, but if oil cloth is used, a strip of tin or very light board should be inserted against the side which is to be decorated as the cloth is very flexible and the lacquer will likely crack. To make the quiver, cut a piece of soft leather 18 by 10 inches and fold with the seam at the bottom. Another piece of leather for fringe may be inserted between the edges, and the quiver laced together with a long shoe string. The open top should either be hemmed or reinforced with leather, and the closed end should be double stitched as the arrows are prone to work themselves through unless special precaution is taken. A belt strap may be made in the same manner as for the rawhide quiver, or a shoulder strap may be used instead if desired. A cheap belt with fancy buckle from the ten-cent store makes a fine shoulder baldric.

Flat quiver made of oil cloth, leather fringed.